GEOLOGY AND GEOMORPHOLOGY OF THE LADY JULIA PERCY ISLAND VOLCANO, A LATE MIOCENE SUBMARINE AND SUBAERIAL VOLCANO OFF THE COAST OF VICTORIA, AUSTRALIA.

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Fig 1: Locality map.

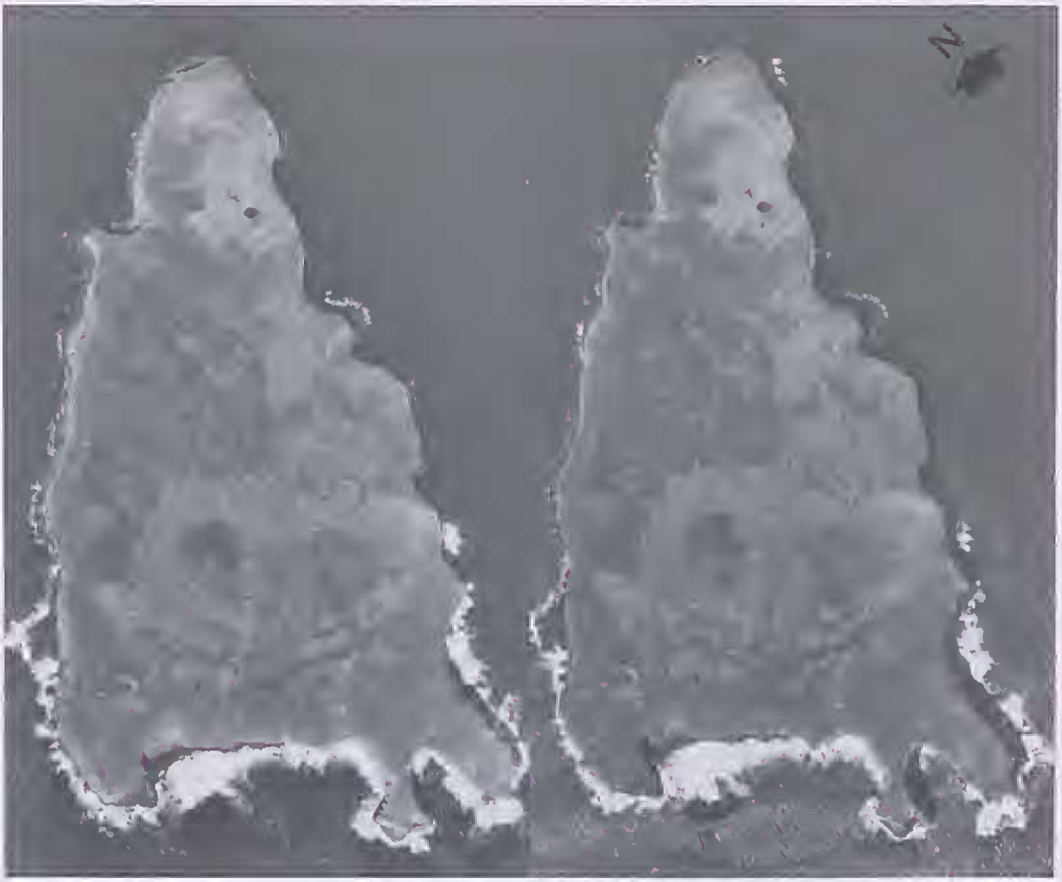


Fig 2: Stereographic air-photos, Lady Julia Percy Island. The remnants of a vent are exposed in the cliffs of the goose-necked promontory of Pinnacle Point (bottom-right), the highest point on the island at 46m. This point is separated from Thunder Point (bottom-right) by Horseshoe Bay, a deeply-incised cove. The prominent palaeo-wave-cut McCoy Platform (bottom-left) lies just west of Seal Bay. Dinghy Cove, the usual access to the flat plateau on the island, is the sheltered bay at top-left.

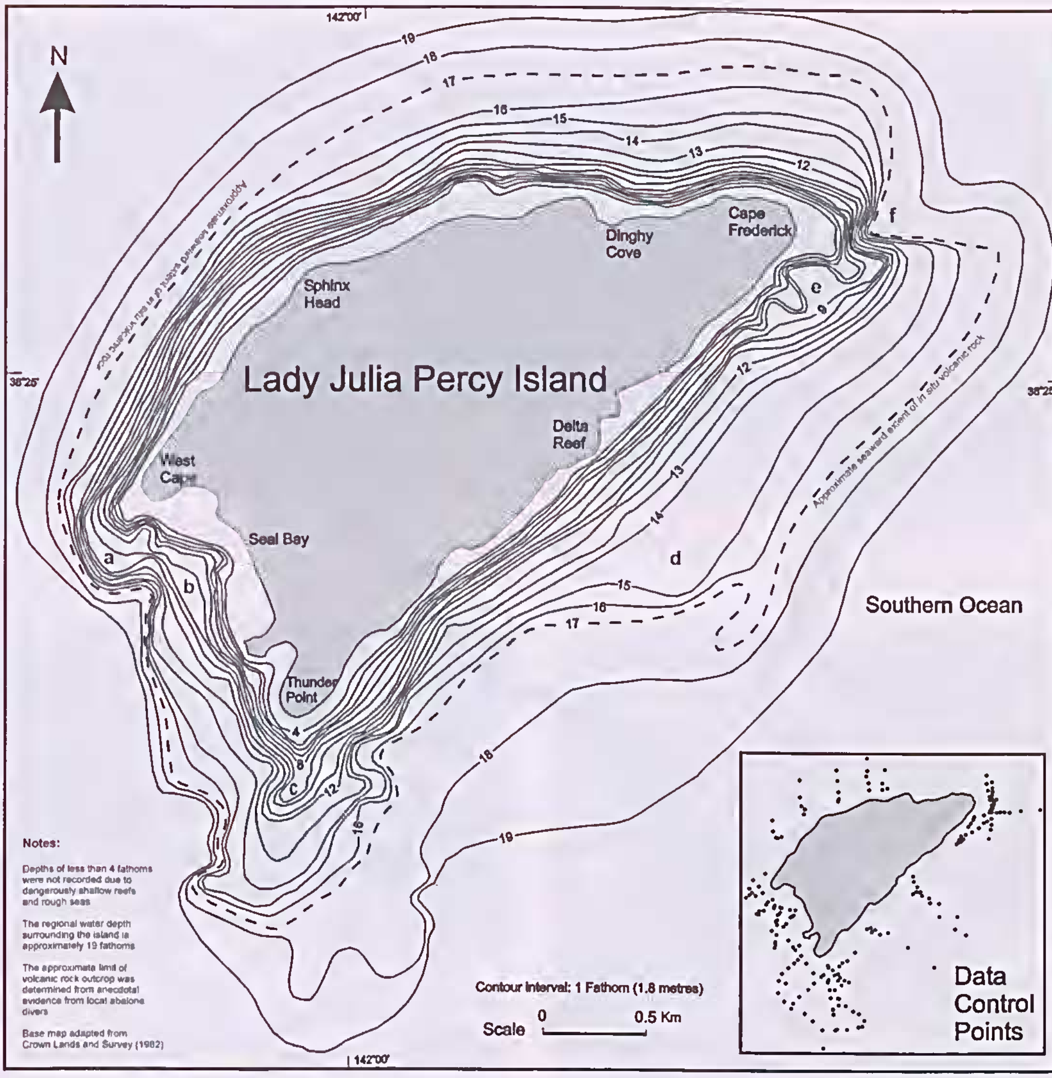


Fig. 3. This bathymetric map highlights the formation of the present Lady Julia Percy Island due to differential modification of the original volcanic delta. The northern edge of the seamount rises consistently and moderately steeply from the sea floor. In contrast the southern edge has been more greatly modified by prevailing southwesterly weather systems. Geomorphic features near West Cape (a), Seal Bay (b), Thunder Point (c) and Delta Reef (d) are interpreted to be submerged wave-cut platforms. The submerged bench and steep slope east of Cape Frederick (e and f) are more sheltered and may therefore be primary volcanic features.

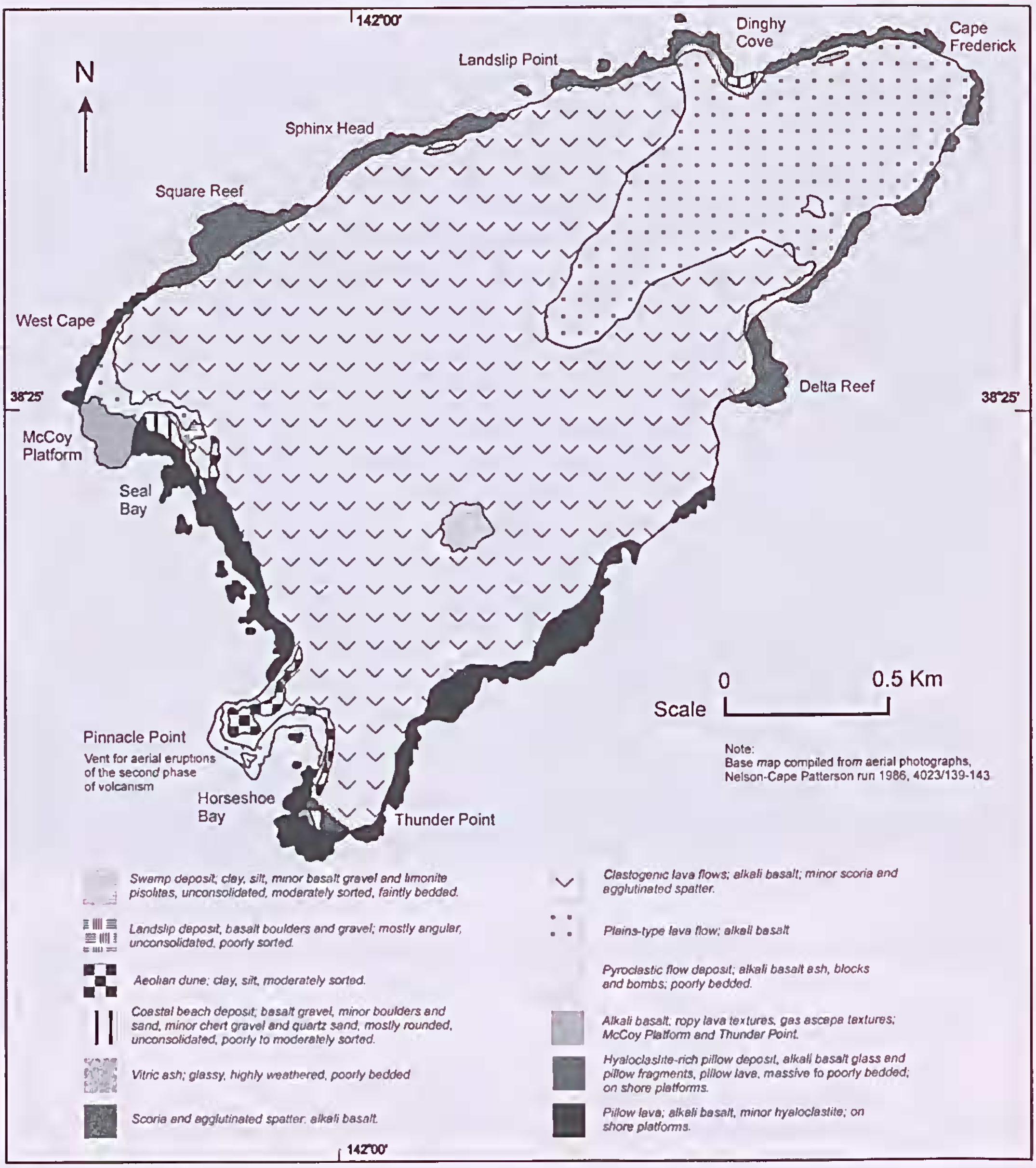


Fig 4: Geology of Lady Julia Percy Island.

Fig 5: NW view of the southern coastline between Delta Reef and Cape Frederick. North-dipping submarine pillow lavas and associated hyaloclastite deposits are capped by flat-lying subaerially-erupted plains-type lava flows.

Fig. 6. A: Solid pillow mass at Square Reef. These classically shaped pillows have convex upper surfaces and bases that are moulded to the shapes of underlying pillows. Note the ubiquitous radial jointing. The transition into the overlying flat sheets of subaerial plains-type lava flows occurs at 12m above sea level.

B: View of the western headland of Dinghy Cove. Entwined pillows intimately associated with hyaloclastite. Note radial jointing and the well defined chilled crust in the upper pillow (clearest near hammer pick), and spreading cracks and blocky surface texture of the lower pillow.

Fig. 7. Longitudinal and transfer spreading cracks in a pillow lobe surrounded by hyaloclastite, western headland of Dinghy Cove.

Fig. 8. Congealed lava tongue overlying a lava bench in the hollow tube of a drained pillow lobe, western headland, Dinghy Cove. Note the tiny lava stalactites extending from the irregular surface of the roof above the lava tongue, and the hyaloclastite that completely encloses this particular pillow.

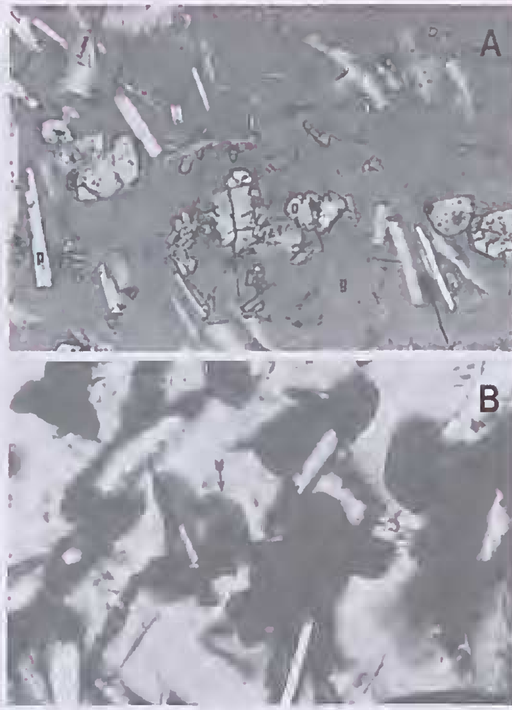


Fig. 9. A: Outer glassy margin of a pillow (Dinghy Cove). The basaltic glass (g) is altered to palagonite and contains well formed crystals of plagioclase (p) and olivine (o). Arrow indicates perlitic fractures. PPL; Field of view 20mm.

B: The spherulitic zone begins with the appearance of opaque crystallites, seen here to form dark spherulitic clusters (arrow) in the basaltic glass. Pale elongate crystals are plagioclase. PPL; Field of view 6.5mm.

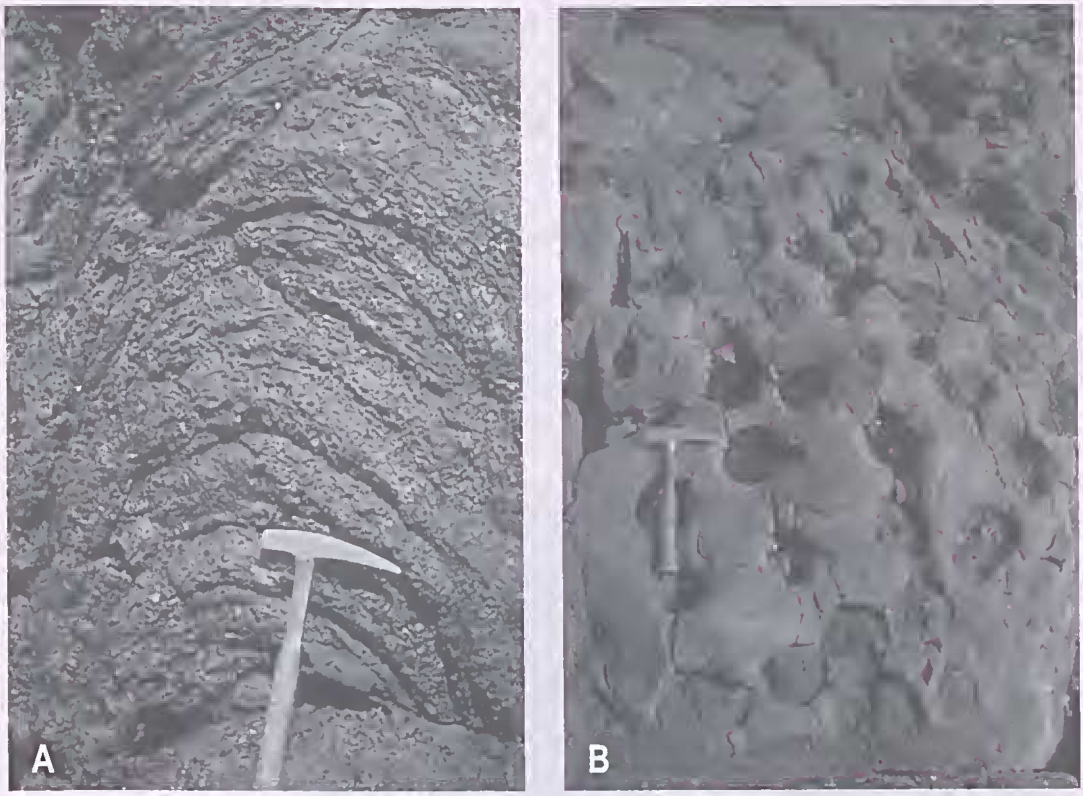


Fig. 10. Some features of the Pahoehoe lava flow, McCoy Platform. A: Ropy lava textures common to Hawaiian-type pahoehoe lavas and; B: Vertical pipe vesicles.

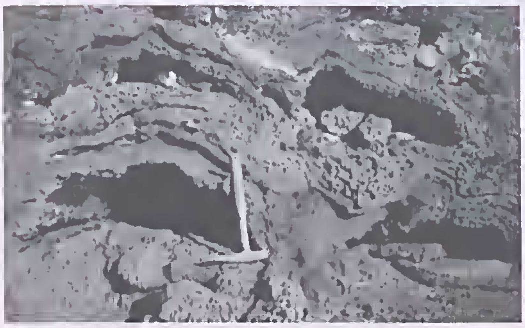
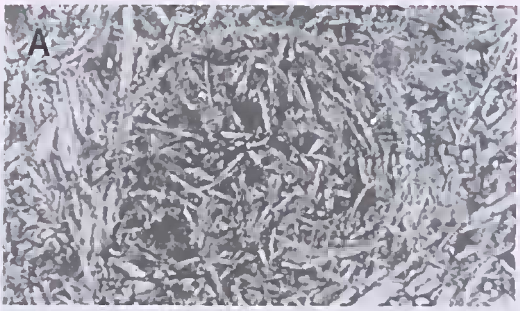


Fig. 11. Internal structure of pahoehoe flow, Thunder Point. Note the distributary tube system within each thin flow. The tube in the lower right corner has a false lava base and secondary carbonate has begun to fill the tube to the top left.



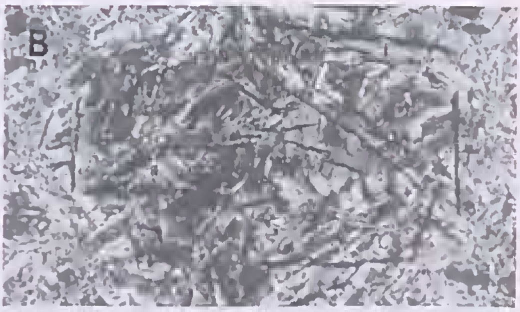


Fig. 12. Globules in the pahoehoe lava. A: Almost spherical globule with a well defined rim of plagioclase and augite crystals. Note the higher concentration of late-crystallising ilmenite within the globule. (Dinghy Cove) PPL; Field of view 40mm. B: Emulsion-like globule with elongated pyroxene (a) and ilmenite (i). Note the coarser grain size of the globule compared to that of the host lava. (McCoy Platform) Cross polars; Field of view 20mm.

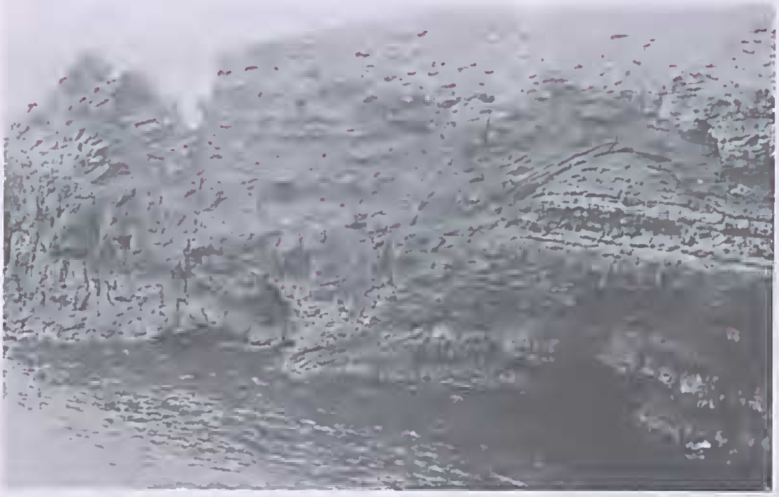


Fig. 13. Volcanic vent at Pinnacle Point, viewed across Horseshoe Bay from Thunder Point. This vent intrudes pillow lavas from earlier submarine volcanic eruptions (bottom-right). The first eruption produced pyroclastic flows (light material middle-right), subsequently truncated by plains-type lava flows seen draped over them at angles of up to 30°. What remains of the throat of the vent is now filled with massive columnar-jointed basalt (bottom-left). The thinly bedded lava and scoriaceous layers (upper-left) at the top of the pinnacle fused to form the elastogenic flows that cap the southern portion of the island.

Fig. 14. Pyroclastic flow exposed in cliffs at Thunder Point (see also Fig. 12). The pick lies against the middle section of flow unit. Notice the upward increasing percentage of large basalt blocks. There is a sharp transition to the top section that is thinly bedded and much finer grained.